

**WHAT IS CLAIMED IS:**

1. A thermal control system for chemically-processing lithographic substrates, comprising:

a multi-zone thermal sensing unit containing a plurality of thermal sensor elements that detect the temperature of a plurality of pre-defined zones on said substrates;

5 a multi-zone thermal adjustment unit containing a plurality of thermal coupler elements that adjusts the temperature of said pre-defined zones; and

a thermal controller unit operatively and communicatively coupled to said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit, said thermal controller unit containing logic circuitry to receive information from said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit, to process information, and to supply  
10 information to said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit,

wherein said multi-zone thermal sensing unit communicates detected temperature information to said thermal controller unit, and

15 wherein said thermal controller unit processes said detected temperature information, generates temperature control information based on said processed temperature information, and communicates said temperature control information to said multi-zone thermal adjustment unit to adjust the temperatures of said pre-defined zones.

20 2. The thermal control system of Claim 1, further including an electronic storage device containing expected temperature information for said pre-defined zones.

3. The thermal control system of Claim 2, wherein said thermal controller unit processes said detected temperature information by including comparisons between said  
25 detected temperature information and said expected temperature information stored in said electronic storage device.

4. The thermal control system of Claim 3, wherein said thermal controller unit

generates said temperature control information to adjust the temperatures of said pre-defined zones by determining whether said comparisons between said detected temperature information and said expected temperature information exceed a pre-specified threshold value.

5

5. The thermal control system of Claim 4, further including a measurement processing module configured to measure attributes of said substrates and generate substrate attribute information.

10

6. The thermal control system of Claim 5, further including revising said expected temperature information for said pre-defined zones based on said substrate attribute information.

7. The thermal control system of Claim 1, further including an electronic storage device containing expected temperature information for said pre-defined zones, wherein said thermal controller unit,

processes said detected temperature information by comparing said detected temperature information and said expected temperature information stored in said electronic storage device and

20 generates said temperature control information by determining whether said comparisons between said detected temperature information and said expected temperature information exceed a pre-specified threshold value.

8. The thermal control system of Claim 7, further including a measurement processing module that measures attributes of said substrates and generates substrate attribute information, wherein said expected temperature information for said pre-defined zones is revised based on said substrate attribute information.

9. A method of thermally controlling the chemical processing of lithographic substrates, comprising:

30 detecting the temperatures of a plurality of pre-defined zones on said substrates through a plurality of thermal sensor elements;

comparing said detected temperatures of said pre-defined zones with expected temperature of said pre-defined zones via a thermal controller unit; and

generating temperature control information by said thermal control unit to adjust said detected temperature of said pre-defined zones in response to determining that said comparisons exceed a pre-specified threshold value; and

adjusting said detected temperature of said pre-defined zones through a plurality of thermal coupler elements in response to said temperature control information generated by said thermal controller unit.

10. The thermal control method of Claim 9, further including electronically storing expected temperature information for said pre-defined zones.

11. The thermal control method of Claim 10 further including, measuring attributes of said substrates, and

generating substrate attribute information based on said measured attributes.

12. The thermal control method of Claim 11, further including revising said expected temperature information for said pre-defined zones based on said substrate attribute information.

13. The thermal control method of Claim 9, further including, electronically storing expected temperature information for said pre-defined zones, measuring attributes of said substrates, and generating substrate attribute information based on said measured attributes.

14. The thermal control method of Claim 13, further including revising said expected temperature information for said pre-defined zones based on said substrate attribute information.

15. A lithographic system comprising:

a lithographic apparatus including,

an illuminator to provide a projection beam of radiation,

5 a support to hold a patterning device, the patterning device configured to pattern the projection beam according to a desired pattern,

a substrate table configured to hold a substrate, and

a projection system to expose the patterned beam onto a target portion of the substrate, and

a wafer track apparatus including,

10 a measurement processing module to measure attributes of said substrate and generate substrate attribute information

at least one processing module configured to chemically process said substrate, and

15 a thermal control system to control the temperature during the chemical processing of said substrate, wherein said thermal control system comprises,

a multi-zone thermal sensing unit containing a plurality of thermal sensor elements that detect the temperature of a plurality of pre-defined zones on said substrate;

20 a multi-zone thermal adjustment unit containing a plurality of thermal coupler elements that adjusts the temperature of said pre-defined zones; and

25 a thermal controller unit operatively and communicatively coupled to said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit, said thermal controller unit containing logic circuitry to receive information from said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit, to process information, and to supply information to said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit,

wherein said multi-zone thermal sensing unit communicates detected temperature information to said thermal controller unit, and

30 wherein said thermal controller unit processes said detected temperature information, generates temperature control information based on said processed temperature information, and communicates said temperature control information to said multi-zone thermal adjustment unit to adjust the temperatures of said pre-defined

zones.

16. The lithographic system of Claim 15, further including an electronic storage device containing expected temperature information for said pre-defined zones, wherein said thermal controller unit,

processes said detected temperature information by comparing said detected temperature information and said expected temperature information stored in said electronic storage device and

generates said temperature control information by determining whether said comparisons between said detected temperature information and said expected temperature information exceed a pre-specified threshold value.

17. The lithographic system of Claim 16, wherein said expected temperature information for said pre-defined zones is revised based on said substrate attribute information.

18. The lithographic system of Claim 16, wherein said at least one processing module is configured as a developer module to develop said wafer, said developer module including an application nozzle to uniformly distribute a solution.

19. The lithographic system of Claim 18, wherein said wafer track apparatus further includes a rinse module dedicated to rinsing said developed substrate, said rinse module including a cleaning nozzle to distribute a cleaning solution, a spinning plate that receives said developed substrate, and a holding device to firmly attach said developed substrate to said spinning plate.

20. A wafer track apparatus comprising:

a measurement processing module to measure attributes of a substrate and generate substrate attribute information

at least one processing module configured to chemically process said substrate,

and

a thermal control system to control the temperature during the chemical processing of said substrate, wherein said thermal control system comprises,

a multi-zone thermal sensing unit containing a plurality of thermal sensor elements that detect the temperature of a plurality of pre-defined zones on said substrate;

5 a multi-zone thermal adjustment unit containing a plurality of thermal coupler elements that adjusts the temperature of said pre-defined zones; and

a thermal controller unit operatively and communicatively coupled to said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit, said thermal controller unit containing logic circuitry to receive information from said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit, to  
10 process information, and to supply information to said multi-zone thermal sensing unit and said multi-zone thermal adjustment unit,

wherein said multi-zone thermal sensing unit communicates detected temperature information to said thermal controller unit, and

15 wherein said thermal controller unit processes said detected temperature information, generates temperature control information based on said processed temperature information, and communicates said temperature control information to said multi-zone thermal adjustment unit to adjust the temperatures of said pre-defined zones.

20 21. The wafer track apparatus of Claim 20, further including an electronic storage device containing expected temperature information for said pre-defined zones, wherein said thermal controller unit,

processes said detected temperature information by comparing said detected temperature information and said expected temperature information stored in said electronic  
25 storage device and

generates said temperature control information by determining whether said comparisons between said detected temperature information and said expected temperature information exceed a pre-specified threshold value.

30 22. The wafer track apparatus of Claim 21, wherein said expected temperature information for said pre-defined zones is revised based on said substrate attribute information.

23. The wafer track apparatus of Claim 21, wherein said at least one processing module is configured as a developer module to develop said wafer, said developer module including an application nozzle to uniformly distribute a solution.

5 24. The wafer track apparatus of Claim 23, wherein said wafer track apparatus further includes a rinse module dedicated to rinsing said developed substrate, said rinse module including a cleaning nozzle to distribute a cleaning solution, a spinning plate that receives said developed substrate, and a holding device to firmly attach said developed substrate to said spinning plate.